Mech 322 Fluid Mechanics

Final Project Climate Change Essay

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Engineering for a Global Change

Introduction

Climate change and global warming are issues that are becoming increasingly important as the 21st century is underway. Engineers, scientists, physicists, and other knowledgeable parties are in search for solutions to these problems, and the window for change is rapidly closing. It is the responsibility of today's generation to produce solutions to these issues before it becomes irreversible. These issues could be the difference in the longevity and continuation of prosperity for mankind and future generations that follow behind us. It is imperative that precise measures are taken, and efforts are made to improve current processes and industries that further enhance these problems.

Climate Change

According to UN.org climate change is defined as "long term shifts in temperatures and weather patterns". Climate change is natural, but it wasn't until the 1800's that it became more of an issue a result of human technological advancements. The primary driver of climate change is the burning of fossil fuels, coal, gasoline, etc. Also under the causation umbrella are industries that involve generating power, manufacturing goods, and cutting down trees (UN.org). The technological and industrial advancements of man have brought with it a price tag, and a hefty one at that. According to UN Habitat, cities consume 78 percent of the world's energy and produce more than 60 percent of greenhouse gas emissions (Generating Power, UN.org). This is alarming as a large part of consumers of energy and producers of emissions are cities whose population will only keep growing. Additionally, manufacturing goods also comes with its own contribution to climate change. For example, the food wasted and sent to landfills accounts for 8 to 10 percent of green house gas emissions according to Un.org. The seemingly small percentages of emissions by different industries adds up and further contributes to the issue at hand.

As a result of these advancements, the temperature of the earth has increased, and it will continue to increase. The key is finding a sustainable balance between the driving factors and the byproducts of these factors. This sustainability is dependent on the severity of the byproducts of emissions, waste, and energy consumption, which can only be improved and limited by engineers who improve these processes and industries.

Global Warming

Global warming is very similar to climate change, in that it is the result of greenhouse emissions from industries, and human technologies. "Global warming occurs when carbon dioxide (CO_2) and other air pollutants collect in the atmosphere and absorb sunlight and solar radiation that have bounced off the earth's surface" (Global Warming 101). This is an important definition in understanding global warming and the impact that humans have on the planet. Everything we do, from mowing the lawn, driving a car, using electricity, running water in our homes, has consequences that the user isn't always aware of. These all produce emissions and multiplied by 7 billion these emissions become a problem. It is not only the responsibility of engineers, scientists, physicists to solve global warming. The citizen must do their part in reducing and eliminating unnecessary energy usage. Part of the reason that society is used to using and consuming as they please is that engineers from 100 years ago weren't looking in to the long term effects that their advancements could have. They were tasked with achieving one goal by any means, and it is now today's engineers who must reverse this process of degrading the earth.

What Can Engineers Do?

Part of the job detail that comes with being an engineer is finding ways to improve processes and industries in place in society. To ensure the continuity of the future, engineers must strive to find ways to mitigate the effects of global warming and climate change. Improving efficiency of internal combustion cars, creating more environmentally conscious modes of transportation for heavily populated areas, and obtaining more renewable energies are just a few of many was that this issue can be pushed towards sustainability. Dr. Gurikar gives insight to this topic: "energy lies at the heart of important environmental issues". This is saying that energy, whether it be consumption or production, is an important factor in climate change and global warming. By reducing energy consumption, or perhaps increasing energy efficiency, and limiting emissions from energy consumption or production, the impact of global warming and climate change can be reduced. Engineers need to devise a plan for this and implement it as soon as possible to prepare for the future.

Technologies Needed

- **Renewable Energy**: Renewable energy is an area that is being widely researched in today. Engineers are discussing and devising new ways to harness unused energy from inefficient

systems already in place, as well as materials that can be recycled and repurposed to minimize downstream waste.

- **Factory Emissions Solutions:** One solution to excessive emissions from plants/factories could be to have stricter standards for the emissions that factories produce. This could include set times for smokestack running or research into cleaner sources of energy.
- **Food/Trash Waste:** Food waste recycling and harnessing of greenhouse gas emissions for other uses is one way to reduce the impact on global warming.

One of the biggest emitters of greenhouse gases are internal combustion engine vehicles. Almost every country in the world has cities with high populations that use vehicles as a mode of transportation. There must be a solution to the growing usage of personal vehicles which results in mass pollution. Take for example electric cars. Electric vehicles are being marketed as a solution to the emissions and efficiency issue with internal combustion engines. If we neglect the manufacturing process and power generation, electric vehicles themselves are more efficient than I.C.E.'s in terms of power generated in the vehicle's battery going through the wheels. However, if we look at the entire process of power generation and efficiency from the power plants that are seeing increased usage due to increase in electric vehicle production, electric vehicles offer no benefit for efficiency and rather than eliminating emissions it simply moves them to the coal burning power plants. This is the problem with society's consumer mindset, in that many people believe that if they can't see the waste or pollution from what they are doing, then it simply doesn't exist. Electric vehicles may be a good way to get the emissions outside of the cities and highly populated areas, but the emissions are relocated from the tailpipe to the power plant. One solution to this could be to schedule charging when it isn't in the power plant where the energy being produced otherwise. Another solution to this could be to refine the hydrogen powered vehicle. There have been many invented hydrogen vehicles that have emerged, but the big motor companies have a hold on the industry and mysteriously these projects do not take off as expected. If we are to continue to consume energy, there must be advancements in technology that use less energy, are more efficient, and produce little to virtually no emissions.

Conclusion

The path to the solution to global warming and climate change is easier said than done. If it were easy, it would have already been solved. The production of technologies and measures to reduce or eliminate these issues will be the result of the collaboration of countless teams across the world. It is the responsibility of today's engineers to provide hope for the future and provide a means to sustainable life for centuries to come.

References

Amanda MacMillan, Jeff Turrentine. "Global Warming 101." *Definition, Facts, Causes and Effects of Global Warming*, 7 Apr. 2021, https://www.nrdc.org/stories/global-warming-101.

"Generating Power." *United Nations*, United Nations, https://www.un.org/en/climatechange/climate-solutions/cities-pollution.

Gurikar, Dr. Shivaraj Gadigeppa. *Global Warming and the Role of Physics in Its Reduction - IJRAR*. July 2016, Volume 3, Issue 3, https://ijrar.org/papers/IJRAR19D1441.pdf.

"International Day of Forests." *United Nations*, United Nations, https://www.un.org/en/observances/forests-and-trees-day.

Rechsteiner, Joseph. *Analysis of Efficiencies: Electric Vehicle (EV) vs. Internal Combustion Engine (ICE).* Kettering University. Mech 320 Thermodynamics Final Project. August 17, 2022.

"Sustainable Consumption and Production." *United Nations*, United Nations, https://www.un.org/sustainabledevelopment/sustainable-consumption-production/.

"What Is Climate Change?" *United Nations*, United Nations, https://www.un.org/en/climatechange/what-is-climate-change.